

RAYMOND L. ORBACH NOMINATION

HEARING BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

ON THE

NOMINATION OF RAYMOND L. ORBACH, NOMINEE TO BE DIRECTOR OF
THE OFFICE OF SCIENCE, DEPARTMENT OF ENERGY

FEBRUARY 26, 2002



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RAYMOND L. ORBACH NOMINATION

TUESDAY, FEBRUARY 26, 2002

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:08 a.m. in room SD-366, Dirksen Senate Office Building, Hon. Jeff Bingaman, chairman, presiding.

OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. This morning's hearing is on President Bush's nomination of Dr. Raymond Orbach to be the Director of the Office of Science at the Department of Energy. The Office of Science is one of the leading supporters of basic scientific research and is the primary supporter of physical science in the Nation, and the Director of that office is responsible for overseeing and managing this very important work.

Dr. Orbach's long and distinguished career as a physicist and as Chancellor of the University of California at Riverside will make him well qualified for this important post and we are very glad to see him nominated for this important post.

I understand that perhaps Senator Murkowski will put a statement in the record in support of the nomination as well. He is not able to be here this morning.

The rules of the committee which would apply to all nominees require that they be sworn in connection with their testimony, so Dr. Orbach, could you just stand and raise your right hand please.

Do you solemnly swear that the testimony you are about to give to the Senate Committee on Energy and Natural Resources shall be the truth, the whole truth and nothing but the truth?

Dr. ORBACH. I do.

The CHAIRMAN. Please be seated. Before you begin your statement, let me ask you the three questions that we address to all nominees before the committee. Number one, will you be available to appear before this committee and other congressional committees to represent departmental positions and respond to issues of concern to the Congress?

Dr. ORBACH. I will be pleased to do so.

The CHAIRMAN. The second question, are you aware of any personal holdings, investments or interests that could constitute a conflict of interest or create the appearance of such a conflict should you be confirmed and assume the office to which you have been nominated by the President?

Dr. ORBACH. My investments, personal holdings and other interests have been reviewed both by myself and the appropriate ethics counselors within the Federal Government. I have taken appropriate action to avoid any conflict of interest. There are no conflicts of interest or appearances thereof to my knowledge.

The CHAIRMAN. Thank you very much. The third question is, are you involved or do you have any assets held in any blind trusts?

Dr. ORBACH. No, sir.

The CHAIRMAN. Okay. At this point I am required to be at a meeting in the Capitol and Senator Feinstein is here to introduce Dr. Orbach and she is a strong proponent of his appointment, and she will conduct the rest of this hearing. So, I wish you well in this new position. I strongly support your nomination.

Dr. ORBACH. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Feinstein.

STATEMENT OF HON. DIANNE FEINSTEIN, U.S. SENATOR FROM CALIFORNIA

Senator FEINSTEIN [presiding]. Thank you very much, Mr. Chairman. I am very happy to welcome Dr. Orbach, I do happen to know him, I do think he is superbly qualified, and it is a distinct honor for me to be able to introduce him to the committee or to the record this morning.

He is the Chancellor of the University of California at Riverside and he has been nominated, as the chairman said, by the President to be Director of the Office of Science at the Department of Energy.

Dr. Orbach has had a brilliant career. He is a most able nominee for this position. He is a distinguished professor of physics. He assumed the role of the sixth chancellor of the University of California at Riverside in April 1992. Under his leadership, University of California at Riverside became the fastest growing school in the UC system with an annual enrollment today of just over 14,000 students. Dr. Orbach has been a leader not only at the university level but also in the community, working with K through 12 educators and parents to help chart the academic course students should follow and must follow to be eligible for college upon graduation.

As was stated, he is a distinguished professor of physics and he sets high standards for academic excellence. He was a member of the faculty at Harvard University and at UCLA before coming to UCR. From 1982 to 1992, he was also provost of the College of Letters and Science at UCLA.

He has done extensive research into theoretical and experimental physics. He has been supported by the National Science Foundation and the Office of Naval Research. His work has resulted in over 240 scientific papers being published.

He has received numerous honors as a scholar. The 1991-92 Andrew Lawson Memorial Lecture at UCR, a National Science Foundation post-doctoral fellowship, the Alfred P. Sloan Foundation fellowship, and the John Simon Guggenheim memorial fellowship.

He is a graduate of the California Institute of Technology, known as Cal Tech, with a BS in physics. He attended the school on a full scholarship. He was awarded his Ph.D. in physics from the Univer-

sity of California at Berkley in 1960 and was received into Phi Beta Kappa honor society at that time.

While Chancellor Orbach's nomination is a gain for the Department of Energy and the energy science community, it is a loss for the University of California and for both of our States. I am looking forward to his confirmation and working with him in the future on many issues of importance to my home State, California, the Department of Energy, and the Office of Science.

May I welcome you, Dr. Orbach, and if you would like to make a statement, the committee would be very happy to receive it.

**TESTIMONY OF DR. RAYMOND L. ORBACH, NOMINEE TO BE
DIRECTOR OF OFFICE OF SCIENCE, DEPARTMENT OF ENERGY**

Dr. ORBACH. Thank you, Senator, for those wonderful comments and for coming here this morning. Your introduction of me is very meaningful and I am greatly appreciative.

I have been honored to be nominated for this position by the President and the Secretary of Energy. My wife is back in California doing a number of chores and I am, my family is represented here by my youngest son, Randy Orbach.

Senator FEINSTEIN. Welcome, Randy.

Dr. ORBACH. Randy is chief trust officer for Commercial Capital Bank, the largest independent bank in Orange County. I'm very pleased that he was able to come today.

I'm looking forward to this position if I'm confirmed. It will be an opportunity to champion the cause of science within the Department of Energy but also on the national scale. It is an honor to be considered for the Office of Science, which has 10 national laboratories which report to the Office plus a major responsibility for scientific research in energy sciences, biological and environmental sciences, and computational science.

The scientific community today is charged with responsibilities as serious as any in our Nation's history and it is imperative that both our educational and research programs in our country be at the highest level and that we work very hard to see to it that all children have the opportunity to excel in their studies and hopefully to encourage them to go into careers in science and engineering.

I have been very generously supported by the U.S. Government in my own scientific career and am deeply appreciative of that and am looking forward to the opportunity to return some of the trust and the support the government has given me in this position.

Let me again thank you, Senator, very much for coming here this morning and introducing me, and I look forward to working with you.

[The prepared statement of Dr. Orbach follows:]

**PREPARED STATEMENT OF DR. RAYMOND L. ORBACH, NOMINEE TO BE DIRECTOR OF
OFFICE OF SCIENCE, DEPARTMENT OF ENERGY**

Mr. Chairman and Members of the Committee: It is a privilege to appear before you today as the President's nominee for Director of the Office of Science at the Department of Energy, to have the opportunity to talk with you, and to answer any questions you may ask. I am honored by the President's and Secretary Abraham's confidence in me and I would like to thank them both for their support.

Because of pressing business in California, my wife of 45 years, Eva Orbach, is unable to be here. She has been my partner in all of my professional life, including

raising three wonderful children who have given us seven perfect grandchildren. I know how much she would have liked to attend this hearing. I am pleased to introduce my youngest son, Randy Orbach, who is representing our family. He lives in Orange County, California, and works as Chief Trust Officer for Commercial Capital Bank, the largest private bank in Orange County.

The Director of the Office of Science serves as the Science Advisor to the Secretary of Energy, and is the Vice Chair of the Department's Research and Development Council. The Office of Science is the steward and principal funding agency of the Nation's research programs in high-energy physics, nuclear physics, and fusion energy sciences. It manages important programs of fundamental research in basic energy sciences, biological and environmental sciences, and computational science, all of which also support the missions of the Department. An example of the extraordinary value of these efforts are the insights being gleaned from the Human Genome Program, an effort initiated by the Office of Science.

The Office is responsible for the overall health, well being, and management of ten laboratories, DOE-owned and contractor operated, recognized internationally for their scientific excellence, for constructing and operating large scientific user facilities, and for providing leadership on a world scale for scientific initiatives. The strength of the United States' economy and defense is dependent in large part on the successful stewardship of science at the Office of Science and her sister agencies.

At this time of crisis, the strength of the scientific community, both in teaching and research, forms the underpinning of our technological response to terrorism, to homeland security, and to the economic opportunities available to our citizenry. The mission of the Office of Science is to provide our President and country with the best science with which to implement our national energy policy. These are awesome responsibilities, and if confirmed, I shall do my best to provide the necessary leadership.

I have been an active scientist for over 43 years. I have been the recipient of generous federal support, both in terms of graduate and postdoctoral fellowships, and research grants and contracts from the National Science Foundation and the Office of Naval Research. I have served for two decades in educational leadership positions, while continuing my teaching and research activities. During the past ten years as Chancellor of the University of California, Riverside, I have taught the introductory course in Freshman physics every year. I have been a champion of access to higher education for all children. I have personally visited elementary, middle, and high schools all over California and in Northern New Mexico, providing the reasons why, the path to, and the support mechanisms for attending college. I have seen my own campus nearly double in enrollment, becoming the most ethnically diverse Research I university in the United States. My mission has been to prove that a truly diverse student body can succeed at the highest level of academic achievement.

If confirmed as Director of the Office of Science, I commit myself to work with you and your colleagues, listening to your advice and direction. I intend to assist with the development of not only the scientific research strength of this nation, but also with the opportunity for everyone in our country to participate in educational development at the highest intellectual level.

Mr. Chairman, I again thank you for the privilege of appearing before you, and your distinguished colleagues. I shall be pleased to respond to questions.

Senator FEINSTEIN. Thank you very much, Dr. Orbach, and I look forward to working with you.

As you can probably tell by the number of committee members that are here, your appointment has absolutely no controversy attached to it. If everybody was here, you might think uh-huh, I might be in trouble. But as you can see, you are very well thought of.

I would like to just ask two quick questions for the record if I might. The Office of Science is responsible for conducting the basic research that underpins the Department of Energy supply technology programs. Many of these programs such as the environmental cleanup program, climate change research, advanced computing, compete for a share of the Department's limited research budget for basic science. So my question is, how would you establish priorities among the Department's many competing claims?

Dr. ORBACH. I would be an advocate for science in the Department of Energy, recognizing the limitations on budget that the Department faces. I would work with the community, with Congress, to establish priorities that are important for the country, and then to champion those priorities within the Department and the Congress and with the public.

Senator FEINSTEIN. Thank you very much. Are there particular areas of basic research such as the human genome, material sciences, nano-science, particle physics that you would single out as needing a greater share of the Department's research budget?

Dr. ORBACH. All four of those are major programs within the Department and I would support all of them plus the other programs that have been established and try to bring as sensible a balance as I could for support across the scientific spectrum.

Senator FEINSTEIN. Thank you. One last question. Have security concerns reduced the ties between the three main nuclear weapons laboratories, Lawrence, Las Alamos and Sandia, and the rest of the national laboratories?

Dr. ORBACH. I have not been in the position so I'm not sure technically what the relationships are, but my impression is that the relationships have continued. The Office of Science supports research at the three laboratories that you mentioned, and I hope that that relationship will continue. It's very important that the basic sciences in the NNSA laboratories be at the highest possible level for the purposes that those laboratories are functioning.

Senator FEINSTEIN. I would certainly agree with that. And you know, I feel very strongly that the security has to be part of this. I recall talking with Dr. Atkinson when he came into my office about this whole issue of security at the labs, and the culture of the lab which of course is an academic culture, and whether the two can really be bridged effectively. And I have a lot of concern that the academic culture is put in perspective of the labs, because security has to be a major part of what you look at, I think, and I will be very candid with you, I think one of the problems we had was when a lot of the security was relaxed throughout the 1990's and by the end of the 1990's we found that there were problems because of that, so I think that is going to be a very interesting area for you to deal with because the academic culture, so to speak, militates against the security. And yet, the type of work that is done, the importance to our Nation of that work militates toward a greater security, so there is a kind of conflict that I observed over time is built into the situation.

Dr. ORBACH. That tension is there, has always been there, and security is the most important issue, but the ability to continue the kind of scientific exchanges and relationships that will give strength to the weapons program is also essential. So it has to be managed, but security comes first.

Senator FEINSTEIN. I am very pleased to hear you say that because I strongly agree and I think the committee would strongly agree with that as well. It is not so easy because of what you have to do to really maintain that security over a substantial period of time. Not only the badges which at one point were removed, but also the willingness of people that work there to cooperate with security.

Dr. ORBACH. I believe the people I have met are fully aware of that responsibility. It is nevertheless an issue that they must deal with in terms of being available to the scientific community, but I think they understand, and it's very important that that be front and center.

Senator FEINSTEIN. That is correct. In any event, thank you so much for being here. I am not going to pursue any other questions. You are superbly qualified and I really look forward to working with you, and this hearing is adjourned.

Dr. ORBACH. Thank you, Senator.

[Whereupon, at 9:22 a.m., the hearing was adjourned.]

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

RESPONSES TO QUESTIONS FROM SENATOR CRAIG

NANOTECHNOLOGY

Question. I know you are familiar with DOE's work in nanoscience and technology. When you visited with my office, I appreciated your awareness of the nanotechnology research going on at Boise State University. Boise State is working jointly with Micron on exciting new technology applications.

What do you think is the appropriate role of both universities and industry partners in the DOE Science program?

Answer. Much of nanoscale science is critical to the principal missions of DOE in science, energy, defense, and environment. For example, nanoscale synthesis and assembly methods will result in significant improvements in solar energy conversion; more energy-efficient lighting; selective catalysts; stronger, lighter materials that will improve efficiency in transportation; highly selective separations membranes; and better sensors and controls to increase efficiency in manufacturing. For these reasons, DOE has been involved in nanoscale science since the early 1980's.

We have found that there is much current interest in nanoscale problems related to energy. In FY 2001, a request for applications resulted in 745 preapplications and 417 formal proposals from universities; a total of \$16.1 million was awarded to 76 of these applications. The DOE laboratories, which were restricted to 4 proposals per laboratory, submitted 46 proposals; a total of \$10.4 million was provided to 12 of these proposals. As you can see, Universities thus play a major role in the DOE nanoscale science activities, having won about 60% of the funds in the FY 2001 competition.

In addition, to the basic research in energy related grand challenges, the Basic Energy Sciences (BES) program supports Nanoscale Science Research Centers (NSRCs). The NSRCs are research facilities for synthesis, processing, and fabrication of nanoscale materials. They will be collocated with existing user facilities and other specialized facilities at DOE labs, which will provide characterization and analytical capabilities. The NSRCs will be operated in the same way as user facilities, but will provide specialized equipment and an interdisciplinary support staff. Access to the centers will be based on peer review. The NSRCs will make it possible to do research requiring specialists in several disciplines and in the use of specialized synthesis, processing, and characterization equipment to be done in one place. Again, universities play a major role in these centers. Principal investigators from universities across the Nation are participating in open workshops to define the NSRC specifications, including instrumentation and research focus areas. In addition, university scientists are expected to make up at least half of the users of these centers.

Question. At the Idaho National Engineering and Environmental Laboratory, a consortium of universities through the Intermountain West—including the University of Alaska—are partners in the management of the INEEL.

As someone who comes to DOE from a university, what do you think could be done to strengthen the role of universities in DOE's Science program?

Answer. The role of university research in the DOE Science program has been, and continues to be, a key part of the Science portfolio. Indeed, although it is not well known, the size of the university research program is very nearly equal to that of the DOE laboratory research program after laboratory funding for operation of large science use facilities is set aside. This is because it is important to incorporate the very best talent from all of the Nation's research institutions in the DOE Science programs. University investigators are part of all of our research programs, they participate in the selection and definition of the large major scientific user facilities that are operated at our DOE laboratories, and work side by side with laboratory scientists at these facilities. Our major new initiatives in nanoscale science

and technology, climate change, genomes to life, and high-performance computing all involve partnerships among university and national laboratory investigators. These partnerships build on the strengths of the participating researchers and their institutions to create programs of outstanding national and international scope.

SCIENCE IN DOE

Question. One of the roles you will fill at DOE is that of the Secretary of Energy's Science Advisor, I am very interested in the investment in research which has the potential to allow the job of DOE's massive clean-up program to be done cheaper and quicker.

Do you believe that DOE must invest significantly in environmental research to find better and more cost effective ways to clean up DOE sites.

Answer. Cleanup is one of the most technically challenging environmental issues we have ever faced—many of the problems we face have never been dealt with before. Estimates for cleanup costs are huge, and there is no certainty of what the ultimate costs will be. This tremendous cost uncertainty is due, in part, to a lack of understanding of the technical issues for understanding risk and likelihood of exposure, as well as a dearth of modern technologies. Basic research can help both determine and characterize the extent of the cleanup program as well as develop capabilities, e.g., bioremediation and natural attenuation, to remediate the waste.

Question. If DOE must invest in this research, should this work be part of the Office of Environmental Management or part of the Office of Science.

Answer. This work should be done in partnership between the Office of Environmental Management (EM) and the Office of Science (SC), as it has since its inception.

RESPONSES TO QUESTIONS FROM SENATOR CANTWELL

Question 1. The National Institutes of Health have, over the past five years, been aggressively expanding health sciences programs, and I believe we all support that sustained growth strategy. The Department of Energy also has a biology mission and has been on a relatively flat growth profile over the same period. Would you clarify your view of the roles of NIH and DOE around biology and each agency's mission?

Answer. The National Institutes of Health (NIH) biology role focuses on human health from diagnosis to treatment.

DOE's biology role focuses on DOE's missions in clean energy, climate change mitigation, bioremediation, and biothreat reduction. DOE also has a role in addressing the health effects of energy production and use, including the effects of low dose and low dose rate of radiation using the modern tools of genomics science and structural biology.

DOE also pursues constructive collaborations with the NIH and builds and operates the scientific user facilities, such as synchrotron light sources, necessary for much NIH funded research. DOE's strengths in the physical sciences, engineering, mathematics, and computation will add to the analysis of health issues, particularly in partnership with the NIH, the National Science Foundation (NSF), and the Environment Protection Agency (EPA).

Question 2. The DOE Biology Environmental Research budget contains a Genomes to Life Program, which is taking advantage of the information gained from the human genome and using it in several applications including energy, environment, and national security. What, in your view, are the most opportune applications for Genomes to Life, and how do you plan to help this program achieve its vast potential?

Answer. The most opportune application of Genomes to Life (GTL) is in development of clean energy sources. By investing in the four goals of the basic genomic research of the GTL program, e.g., understanding the molecular machinery of life, the cellular regulatory networks, the functional diversity within microbial and plant communities and by building the appropriate computational infrastructure we can provide the knowledge base necessary to develop the technologies to produce abundant clean fuels, such as hydrogen. Energy biomass is another potential high impact application. Another application is in enhancing the biosphere to absorb greater amounts of carbon dioxide from the atmosphere. Other favorable applications are in bioremediation of DOE sites' stubborn mixed wastes as well as in the national effort to detect and defeat bioterrorism.

I plan to help this program achieve its vast potential by leveraging the existing and planned user facilities to realize the goals of the GTL.

Question 3. A 900 MegaHertz spectrometer, the most powerful nuclear magnetic resonance (NMR) tool in the world, is due to arrive at Pacific Northwest National

Laboratory next month. Can you describe the significance of having the largest NMR wide-bore spectrometer at a DOE Laboratory?

Answer. The 900 MegaHertz NMR is the last of over 100 instruments to be delivered to the Environmental Molecular Sciences Laboratory (EMSL). The EMSL is one of many DOE user facilities that serve to provide the scientific community with unique scientific instrumentation for cutting edge research. The significance of the 900 MHz NMR to DOE is that it will allow academic and university scientists funded under DOE's Genomes to Life and other programs to resolve for the first time biological structures important to DOE missions. The 900 MHz wide-bore NMR represents a major technical breakthrough in NMR instrumentation. The 900 MHz NMR will be used to image and determine the structure of larger and more complex molecular structures than can be done with current systems. For example, the higher magnetic field will provide sharper images and allow scientists to understand how toxic metals interact with complex cellular machinery and how DNA is damaged and repaired in response to environmental and energy-related toxic substances.

RESPONSES TO QUESTIONS FROM SENATOR LANDRIEU

EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH

Higher education in the State of California in general, and the University of California System in particular, has been very fortunate to have a long-standing relationship with the Energy Department and its predecessor agencies. This has permitted the development of a very vigorous energy research capability in the state which, of course, enables research institutions in their efforts to attract researchers and additional support for scientific research, particularly in energy-related fields, such as the basic energy sciences, biological and environmental research and high-energy physics programs you will oversee as the Director of the Office of Science.

Question. Are you aware of the Experimental Program to stimulate Competitive Research (EPSCoR) that is designed to assist states to build their research capacity?

Answer. Yes I am aware of the DOE/EPSCoR program. The program was started in FY 1991 with an annual budget of \$4,000,000. The FY 2002 request is \$7,679,000.

Question. The Energy Department has a modest but effective EPSCoR program that is managed out of the Basic Energy Sciences office. How do you intend to use this program to help broaden DOE's energy research base in states such as Louisiana, North Dakota, South Dakota, Oklahoma, Idaho, Alabama, Montana, Nebraska and Alaska?

Answer. The DOE/EPSCoR program sponsors two types of research grants: 1) implementation grants and 2) laboratory-state partnership grants. Respectively, these grants: 1) allow states to form "clusters" of research to build significant state-wide core competencies and 2) allow researchers in EPSCoR states to participate individually in the EPSCoR program. Requests for Application (RFA) for these grants are published in the Federal Register whenever funds are available for the program. All grant applications are peer reviewed with respect to the scientific quality, programmatic interests and priority and relevance to the EPSCoR objective. All the states mentioned above are DOE/EPSCoR eligible states and are invited to send applications to the program for possible funding.

Question. Please describe the Department's Experimental Program to Stimulate Competitive Research. What states currently receive EPSCoR grants and what are their research topics?

Answer. The Department of Energy's EPSCoR is a federal-state partnership designed to help the nation and the states better meet today and tomorrow's energy needs. States eligible for DOE/EPSCoR support include: Alabama, Alaska, Arkansas, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Vermont, West Virginia, Wyoming, and the Commonwealth of Puerto Rico. The principal objective of the DOE/EPSCoR program is to enhance the abilities of the designated states to conduct nationally competitive energy-related research and to develop science and engineering manpower to meet current and future needs in energy related areas. This program addresses basic research needs across all of the Department of Energy's research interests. The DOE/EPSCoR program is located in the Department of Energy's Basic Energy Sciences program.

To maximize the effectiveness of the program, the development of science and engineering manpower component is closely coupled with the basic research part of the program. The program places particular emphasis and priority on collaboration by the state faculty with scientists from the DOE national laboratories where unique scientific and technical capabilities are present. This program strives to engage

other DOE program offices within the Department by encouraging participation by program managers from other offices in the review process and cofunding of the successful proposals.

Following is a list of states currently receiving EPSCoR grants and their respective research topics:

States	Research Topic
Alabama	Material Sciences, Computer Science, Fusion Energy Sciences
Arkansas	Materials Science, High Energy Physics, Fossil Energy
Idaho	Biological Sciences, Environmental Sciences
Kansas	High Energy Physics, Materials Science, Renewable Energy
Kentucky	High Energy, Nuclear Physics, Materials Science
Louisiana	Materials Sciences
Mississippi	Renewable Energy, Materials Science, Computer Sciences
Montana	Materials Science, Fusion Energy Sciences, Wind Energy
Nebraska	Environmental Sciences, Materials Science
Nevada	Defense Programs, Geosciences, Chemical Sciences, Materials Science, Renewable Energy
Oklahoma	Materials Science, High Energy Physics, Fossil Energy
Puerto Rico	High Energy Physics, Materials Science
South Carolina	High Energy Physics, Chemical Sciences, Materials Sciences
Vermont	Computer Sciences, Materials Science, Biological sciences
West Virginia	Fossil Energy, Materials Science, Chemical Sciences, Fusion Energy Sciences
Wyoming	Materials Science

Question. What is the Department's FY 2003 request for the EPSCoR program?
Answer. The Department's FY 2003 Request is \$7,655,000.

Question. What are some of the accomplishments of the Department's EPSCoR program?

Answer. The EPSCoR program funds basic research in support of all programmatic needs of the department. The accomplishments are grouped according to the relevant DOE programmatic office.

Basic Energy Sciences: Direct evidence was demonstrated for the importance of magnetostatic interactions in characterizing novel nanostructured materials. Inclusion of such interactions in the study of new and novel materials should lead to better characterization of these materials. The Interfacial Force Microscope has been used to obtain the elastic modulus for several polymer and polymer matrix composite systems with nanometer spatial resolution. These studies are important for developing novel lightweight polymer matrix composites. Kirkwood-Buff theory has been successfully applied for the interpretation of thermodynamic solvation effects in terms of the distribution of water and salts around benzene. This successful demonstration holds promise for application to a wide range of research studies using molecular dynamics simulations. Purification of single-walled, shortened, carbon nanotubes by capillary electrophoresis was demonstrated by using UV/visible and real-time Raman spectroscopy. This should pave the way for isolating different sizes of carbon nanotubes.

Biological and Environmental Research: Significant progress is being made in crystallizing and solving the structure of a Q50K mutant for use in developing a novel methodology for pharmaceutical design targeting DNA expression.

Environmental Management: Enzyme-activity dependent probes and inhibitors were used to characterize bacterial isolates from the tri-chloro-ethylene (TCE) contaminated site at INEEL. These probes will be very useful in environmental management issues at the DOE sites. Developed unique magnetorestriction based sensor technology for measuring temperature, elasticity, pressure, pH, liquid viscosity, and liquid density. This technology will be very useful for application to environmental cleanup and environmental management issues.

Renewable Energy and Efficiency: A first commercial wind power facility, a 22 megawatt wind turbine utility, is being established on the Blackfeet nation's land. This facility is based on the research supported by EPSCoR. A new technology "Resin Transfer Molding" is developed and its application to manufacture of wind turbine blades was demonstrated.

Defense Programs: Optical sensors based on Faraday rotation were developed for monitoring electric and magnetic fields. These sensors are being developed for use in improved operation of the electron beam accelerators and imaging systems that are used in DOE stockpile stewardship program.

Question. What states currently hold DOE EPSCoR implementation awards?

Answer. The states of Alabama, Kansas, Kentucky, Mississippi, Montana, Nebraska, Nevada, Puerto Rico, Vermont, and West Virginia currently hold DOE EPSCoR implementation awards.

Question. What are The research topics is these states?

Answer. Following are the research topics by states: Alabama (Materials Science), Kansas (High Energy Physics/Materials Science), Kentucky (Nuclear Physics/Materials Science), Mississippi (Renewable Energy/Biomass), Montana (Materials Science), Nebraska (Environmental Sciences), Nevada (Defense Programs/Radiography), Puerto Rico (Materials Science), Vermont (Biological Sciences), West Virginia (Fossil Energy).

NATIONAL INSTITUTES FOR GLOBAL ENVIRONMENTAL CHANGE

Question. Are you familiar with the National Institutes for Global Climate Change (NIGEC) that is headquartered at the University of California at Davis?

Answer. Yes, I am familiar with NIGEC and the six regional NIGEC Centers.

Question. Please describe the program and how it can contribute to efforts to better understand the science of global climate change.

Answer. NIGEC was established to contribute to the knowledge base of climate change research. Its focus is the reduction of key scientific uncertainties inherent in the projections of future climate states, and the perturbations to the climate system attributed to human activities. NIGEC's mission is to support DOE's climate change research objectives as well as those of the U.S. Global Change: Research Program. Present focus areas of NIGEC are the influence of terrestrial ecosystems in the U.S. on the carbon cycle, and the effects of increasing carbon dioxide and climatic change on ecosystems important to the Nation. NIGEC carves out its mission by supporting university researchers from the National Office at the University of California, Davis, and the six Regional Centers at Tulane University, the University of Nebraska, Indiana University, Harvard University, the University of Alabama, and the University of California, Davis.

Question. What are the Department's plans for this program in FY 2003?

Answer. Most of The NIGEC university grants are on a 3-year cycle, so about two thirds of the individual projects will continue in FY 2003. For the projects that will turn over in FY 2003, the Department expects NIGEC to initiate new projects that are similar in scope, but with an increased emphasis on effects of potential climate change on ecosystems important to the Nation.

Question. Please describe some of the accomplishments of the NIGEC program. What are some of the activities of the South Central Center at Tulane University?

Answer. NIGEC contributed science used in the recent National Assessment of Potential Consequences of Climate Variability and Change on the U.S. The primary result of the Assessment was identification of key uncertainties that need to be resolved by additional research—NIGEC has also made, and continues to make, critical contributions to our understanding of the carbon sink strength of forests in several regions of the country. This is important to predicting future atmospheric carbon dioxide levels, a main forcing agent in global warming.

The South Central Center is carrying out the critical task of testing models used To predict effects of climate change on natural resources and how the land surface of The U.S. affects climate variability and change. A notable activity of the South Central Center is its recent release of a Request for Proposals to begin studies of encroachment of woody vegetation into grasslands and pastures in the south central U.S. This is a topic of great importance to U.S. agriculture, which may be significantly affected by increasing atmospheric carbon dioxide and climatic change.